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ABSTRACT

In a study in 1996, the Consortium on Chicago School Research found that many classroom assignments in writing and mathematics made only modest academic demands on high school students. In this study, the nature of assignments in schools participating in the Annenberg Challenge reform effort in 1998-1999 was studied, to determine whether teachers were assigning more demanding tasks. The analysis was based on 349 assignments from 74 teachers in 1997, 953 assignments from 116 teachers in 1998, and 715 assignments from 87 teachers in 1999. Each summer following the year in which the assignments were collected, a team of 14 to 20 teachers from other Chicago public schools applied scoring rubrics to assess the authenticity of the intellectual work demanded in these assignments. After each assignment had been scored, the numerical scores were analyzed using a many-facet Rasch measurement model to create separate scales for each grade and subject, and then to divide scores by degree of challenge. The quality of classroom assignments in the field sample of Annenberg Challenge schools improved between 1997 and 1999. The level of authenticity in those assignments described as challenging had clearly risen in the period, but for those described as typical, the results were more mixed. While these improvements are encouraging, the overall level of challenge in mathematics assignments remains quite low. More than 80% of the sixth and eighth grade assignments in 1999 provided only minimal or no challenge. Writing assignments showed more evidence of challenge. A round of data collection in 2000-2001 will provide a more definitive basis for conclusions about school improvement. (Contains 4 figures, 2 tables, 9 endnotes, and 10 references.) (SLD)

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Improving Chicago's Schools
A Data Brief of the Chicago Annenberg Research Project

Chicago Classroom Demand for Authentic Intellectual Work: Trends from 1997-1999

Anthony S. Bryk, Jenny K. Nagaoka, Fred M. Newmann

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Chicago Classroom Demands for Authentic Intellectual Work: Trends from 1997-1999

Anthony S. Bryk, Jenny K. Nagaoka, and Fred M. Newmann

October 2000

Background

The research reported here has been conducted by the Consortium on Chicago School Research for the Chicago Annenberg Challenge. The Challenge seeks to advance the educational opportunities afforded Chicago's children by supporting 45 networks of schools that work together with external partners to promote more ambitious intellectual work for all students. These efforts seek both to improve students' basic skills in reading, mathematics, and writing, and to assure that all students have opportunities to engage in academic work at a high level.

Researchers at the Consortium on Chicago School Research are examining academic progress in Annenberg Challenge schools in two ways. First, for all Annenberg Challenge schools we are undertaking trend analyses of student learning gains on basic skills, as measured by standardized tests.[1] Second, we are complementing these test score analyses with an in-depth longitudinal study of the quality of intellectual work occurring in a sample of Annenberg Challenge schools.

We view this two-pronged strategy as essential to developing a full picture of academic improvements in Annenberg Challenge schools. Trends on the Iowa Tests of Basic Skills (ITBS) have been improving systemwide since the early 1990s, with especially rapid gains in recent years. As the Chicago Public Schools have begun to use ITBS test score results for high-stakes accountability—to intervene and reconstitute schools, to require students to attend summer school and even be retained in a grade, and as part of principals' annual personnel evaluations—some reformers worry that these test score trends might be misleading. Incentives exist to "improve the scores" in ways that might have little to do with actual improvement in instruction. In our view, the gathering of actual classroom assignments and the analysis of the intellectual demands embedded in them offers a good complement to the test score data. These assignments—what teachers ask students to do on a day-to-day basis—are direct indicators of the quality of instruction. If instruction is genuinely improving, it should show up in changes in teachers' assignments.

In our view, the gathering of actual classroom assignments and the analysis of the intellectual demands embedded in them offers a good complement to the test score data. These assignments—what teachers ask students to do on a day-to-day basis—are direct indicators of the quality of instruction.

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Has the Quality of Classroom Assignments Improved in Annenberg Challenge Schools?

This is the second Consortium report on the quality of academic work in Chicago classrooms. Previously, in "The Quality of Intellectual Work in Chicago Schools: A Baseline Report" (Newmann, Lopez, and Bryk, 1998), we examined both classroom assignments from the first year of the study (1996-1997) and the student work performed on them. (The project will gather a final sample of assignments and student work in 2000-2001.) We found that the typical classroom assignment in both writing and mathematics made only modest academic demands on students. Generally, assignments consisted of simple drill and fill-in-the-blank practice exercises that rarely moved beyond rudimentary basic skills. However on a more encouraging note, we found that when teachers did assign more demanding classroom tasks, most students were able to complete them and demonstrate more complex intellectual performance. This brief asks whether we were seeing more of these kinds of assignments in 1998-1999 than when the Annenberg Challenge began in 1996.

A Framework of Authentic Achievement as the Basis for Evaluating the Intellectual Demands of Classroom Work

To guide our analysis of the intellectual demands embedded in classroom instruction, the Chicago Annenberg Research Project adopted the analytic framework of "authentic intellectual work" originally developed by the federally funded National Research Center on School Organization and Restructuring.[2] In brief, authentic classroom instruction makes demands on students:

- To apply basic knowledge and skills to solve new real world problems
- To reach adequate solutions to these problems by organizing, interpreting, evaluating, and synthesizing information
- To ground their solutions in solid information, concepts, and principles from the academic disciplines; and
- To communicate effectively to others their conclusions.

These intellectual skills are essential for success in the increasingly complex contemporary workplace where even entry level workers are asked to use knowledge to solve problems rather than just mechanically apply previously learned facts and procedures. The rationale for this framework and greater detail on these key ideas are detailed in our first report.[3]

Collecting and Analyzing Classroom Assignments

The Chicago Annenberg Research Project began collection of classroom assignments in 1996-1997 with 12 Annenberg elementary schools, expanding to 18 schools in 1997-1998, and 16 schools in 1998-1999. These schools represent a good cross-section of both Annenberg Challenge sites and the larger Chicago public school system. (A comparison of demographics in CPS, Annenberg Challenge, and sample schools is in Appendix A.) Within this sample of schools, we collected writing and mathematics assignments in grades three, six, and eight in order to span the typical range of Chicago elementary school classrooms. These classes were selected because at the outset of the study these were the target grades for the statewide Illinois Goals Assessment Program (IGAP). Data from these grades would allow us to link classroom assignments to student performance on state tests of reading, writing, and mathematics as well as ITBS scores in reading and math. These results are presented in a separate report.[4]

Two teachers in each participating sample school, from grades three, six, and eight were asked to submit both typical assignments and challenging assignments in writing and math. Project researchers defined typical

assignments as reflecting the daily work occurring in the course of a regular school week. In contrast, challenging assignments were defined as those that the teacher believed would provide the best indicators of how well students understood the subject at a high level. The teachers were asked to provide four typical assignments per year and two challenging assignments per year, for a total of six assignments.[5] The actual number of assignments collected from teachers in a given year ranged from one to six, with most teachers providing four or five assignments in each subject area. For the analysis reported here, we examined a total of 349 assignments from 74 teachers in 1997, 953 assignments from 116 teachers in 1998, and 715 assignments from 87 teachers in 1999.* See Appendix A for further details.

These [authentic] intellectual skills are essential for success in the increasingly complex contemporary workplace where even entry level workers are asked to use knowledge to solve problems rather than just mechanically apply previously learned facts and procedures.

Each summer following the school year that assignments were collected, a group of 14-20 teachers from other Chicago public schools was recruited to apply scoring rubrics that assess the authenticity of intellectual work demanded by the assignments. Teachers rated each assignment against the three standards of intellectual challenge: construction of knowledge, written communication, and connection to students' lives.[6] The standard for construction of knowledge measured the extent to which the assignment asked students to interpret, analyze, or evaluate information, rather than simply reproduce facts or procedures. Written communication examined whether the task required students to draw conclusions, and support and elaborate them through extended writing. The standard for connection to students' lives looked at the degree to which the assignment asked students to connect the topic or problem to their lives and whether the task resembled a problem that they might encounter in daily life beyond school.

Each summer we formed six teams of teacher raters, one for each subject matter/grade level combination (i.e., third grade writing, third grade math, etc.). Each team member was randomly assigned to score assignments, one standard at a time. As a result, each assignment was typically reviewed by three different raters, one for each standard. In order to control for potential rater bias, a random sub-sample of assignments was also scored by a second rater. The information gained by this rescoring process allowed us to accurately assess and adjust each assignment score for the differential effects associated with individual raters.[7]

After each assignment had been scored on the three standards, the numerical scores were analyzed to create an overall measure of intellectual quality. We used a many-facet Rasch measurement (MFRM) model to create separate scales for each grade and subject. The MFRM analysis also statistically adjusted the original scores for differences in the severity of scorers and differences among the three standards.[8] We then transformed these measures to a ten-point scale, with ten being the highest and zero being the lowest score. To provide a more substantive standards-based interpretation for these data, we also divided the distribution of adjusted scores into four categories: extensive challenge, moderate challenge, minimal challenge, and no challenge.

A sample of assignments scored in 1997 and 1998 was also scored in 1999. This allowed us to place assignment scores (within a grade and subject) from different years on a common scale that adjusted for differences over time in the relative severity of scorers and standards. All results reported here are in terms of the scales established as part of the ratings for the 1999 assignments.[9]

* As a shorthand, 1997 refers to the 1996-1997 academic year. The same is true for 1998 and 1999 respectively.

Examples of Sixth Grade Assignments

High Scoring Writing Assignment

Write a paper persuading someone to do something. Pick any topic that you feel strongly about, convince the reader to agree with your belief, and convince the reader to take a specific action on this belief.

Commentary

In this high scoring assignment, demands for construction of knowledge are evident because students have to select information and organize it into convincing arguments. By asking students to convince others to believe and act in a certain way, the task entails strong demands that students support their views with reasons or other evidence, which calls for elaborated written communication. Finally, the intellectual challenge is connected to students' lives because they are to write on something they consider to be personally important.

Low Scoring Writing Assignment

Identify the part of speech of each underlined word below. All eight parts of speech—nouns, pronouns, verbs, adjectives, adverbs, prepositions, conjunctions, and interjections—are included in this exercise.

1) My room is arranged for comfort and efficiency.
2) As you enter, you will find a wooden table on the left.
3) I write and type.
4) There is a book shelf near the table.
5) On this book shelf, I keep both my pencils and paper supplies.
6) I spend many hours in this room.
7) I often read or write there during the evening.

Commentary

This assignment requires no construction of knowledge or elaborated communication, and does not pose a question or problem clearly connected to students' lives. Instead it asks students to recall one-word responses, based on memorization or definitions of parts of speech.

High Scoring Mathematics Assignment

Pick a stock. You have $10,000 to invest. Calculate how many shares you can buy at the current price. Every week for the next 10 weeks you will check in the newspaper whether your stock has gone up or down. You will chart the progress of your stock on the bulletin board. The chart is organized to record prices in 1/4 points, but the newspaper reports the prices in 1/16 points, so you will need to convert.

At the end of the 10 weeks, determine whether you have made a profit or loss and predict what you think your stock will do based on the results of the chart. Decide whether you will buy more or sell your stock. At this point you will give an oral report on your stock, what happened to it, and what you decided to do.

Commentary

This assignment scores high on construction of knowledge because each week students must decide how to represent the current price of the stock on a chart different from that which appears in the newspaper. They also have the opportunity to draw conclusions about their current profits or losses, which involves deciding what numbers to add, subtract, and multiply in order to compute them. The assignment's demands for charting the stock requires some written mathematical communication, and one would assume that preparation for the oral report would entail some elaborated mathematical communication. By focusing on mathematics related to a stock that students choose to "own," the assignment draws connections to mathematics and students' lives beyond school.

Low Scoring Mathematics Assignment

Name _____

Adding and Subtracting Fractions and Mixed Numbers: Common Denominators

Add or subtract. Reduce if possible.

1. $\frac{2}{3} + \frac{1}{3}$	**2.** $\frac{3}{8} + \frac{1}{8}$	**3.** $\frac{3}{10} + \frac{1}{10}$	**4.** $\frac{1}{4} + \frac{3}{4}$
5. $\frac{7}{8} - \frac{5}{8}$	**6.** $\frac{4}{5} - \frac{2}{5}$	**7.** $\frac{9}{10} - \frac{3}{10}$	**8.** $\frac{5}{6} - \frac{3}{6}$

Commentary

This assignment requires no construction of knowledge to address a mathematical problem, no extended writing to explain mathematical conclusions, and it does not pose a mathematical problem connected to students' lives. Instead, it asks students only to fill in numerical answers to problems on addition, subtraction, and reduction of fractions based on memorized algorithms.

Finally, because of changes in the sample of schools over time and the variable amounts of data provided by different teachers, a statistical model was fit to estimate time trends, adjusting for the missing data. We computed both an overall composite trend and separate trends for challenging versus typical assignments. See Appendix B for further details on the statistical model used to estimate these trends.

Trend Results

The quality of classroom assignments in the field sample of Annenberg Challenge schools improved between 1997 and 1999. As shown in Table 1 and Figures 1 and 2, overall scores were generally higher in the two years following 1997, except in sixth grade math where the scores appeared unchanged. The level of authenticity in challenging assignments had clearly increased from 1997 to 1999, while the results for typical assignments appeared somewhat more mixed. In general, both the 1998 and 1999 results exceeded the base year of 1997. While in several instances the 1999 average scores were somewhat lower than in 1998, an overall trend of improvement remains. As expected, the assignments designated by teachers as challenging tended to score higher than typical assignments.

While these improvements are encouraging, the overall level of challenge in math assignments still remains quite low. More than 80 percent of the sixth and eighth grade math assignments in 1999 provided only minimal or no challenge. In contrast, 1999 writing assignments showed more evidence of intellectual challenge, with 48 percent in sixth grade showing moderate or extensive challenge, 56 percent in eighth grade, and 64 percent of third grade assignments. Details of the distribution in the categories for mathematics and writing assignments are in Table 2 and Figures 3 and 4.

The results reported are interim findings from the first three years of the Annenberg Challenge. A final round of data collection will occur in 2000-2001, which will provide a more definitive basis for conclusions about the extent of school improvement over the last five years

Table 1

Average Scores on Intellectual Quality for Typical and Challenging Assignments

Writing Grade 3

	Typical	Challenging	Overall
1997	3.67	4.82	4.28
1998	4.34	4.65	4.41
1999	5.19	5.29	5.26

Writing Grade 6

	Typical	Challenging	Overall
1997	4.77	6.53	5.75
1998	7.52	7.77	7.61
1999	6.19	6.91	6.41

Writing Grade 8

	Typical	Challenging	Overall
1997	4.55	6.05	5.36
1998	6.96	6.78	6.88
1999	5.95	6.19	5.97

Math Grade 3

	Typical	Challenging	Overall
1997	4.34	5.41	4.96
1998	6.06	6.37	6.19
1999	5.71	7.06	6.16

Math Grade 6

	Typical	Challenging	Overall
1997	5.92	6.04	6.00
1998	6.00	6.38	6.11
1999	4.93	7.20	5.80

Math Grade 8

	Typical	Challenging	Overall
1997	4.90	5.33	5.07
1998	4.79	5.86	5.11
1999	5.19	6.54	5.63

Note: The data above are a measure of relative change over time within grade level, subject across years, and should not be compared across grades or subjects.

Figure 1

Trends in Writing Assignments
1997 to 1999

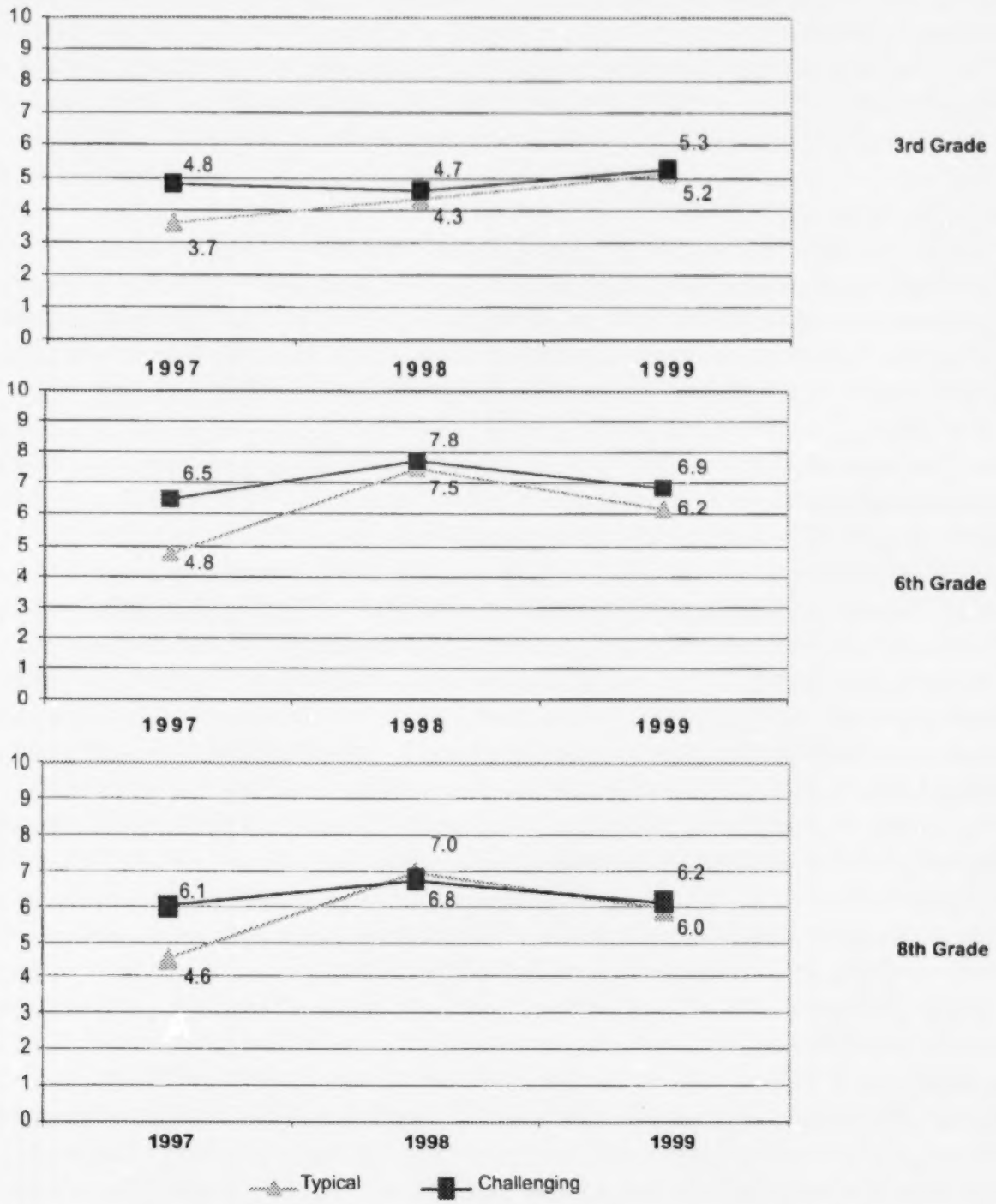
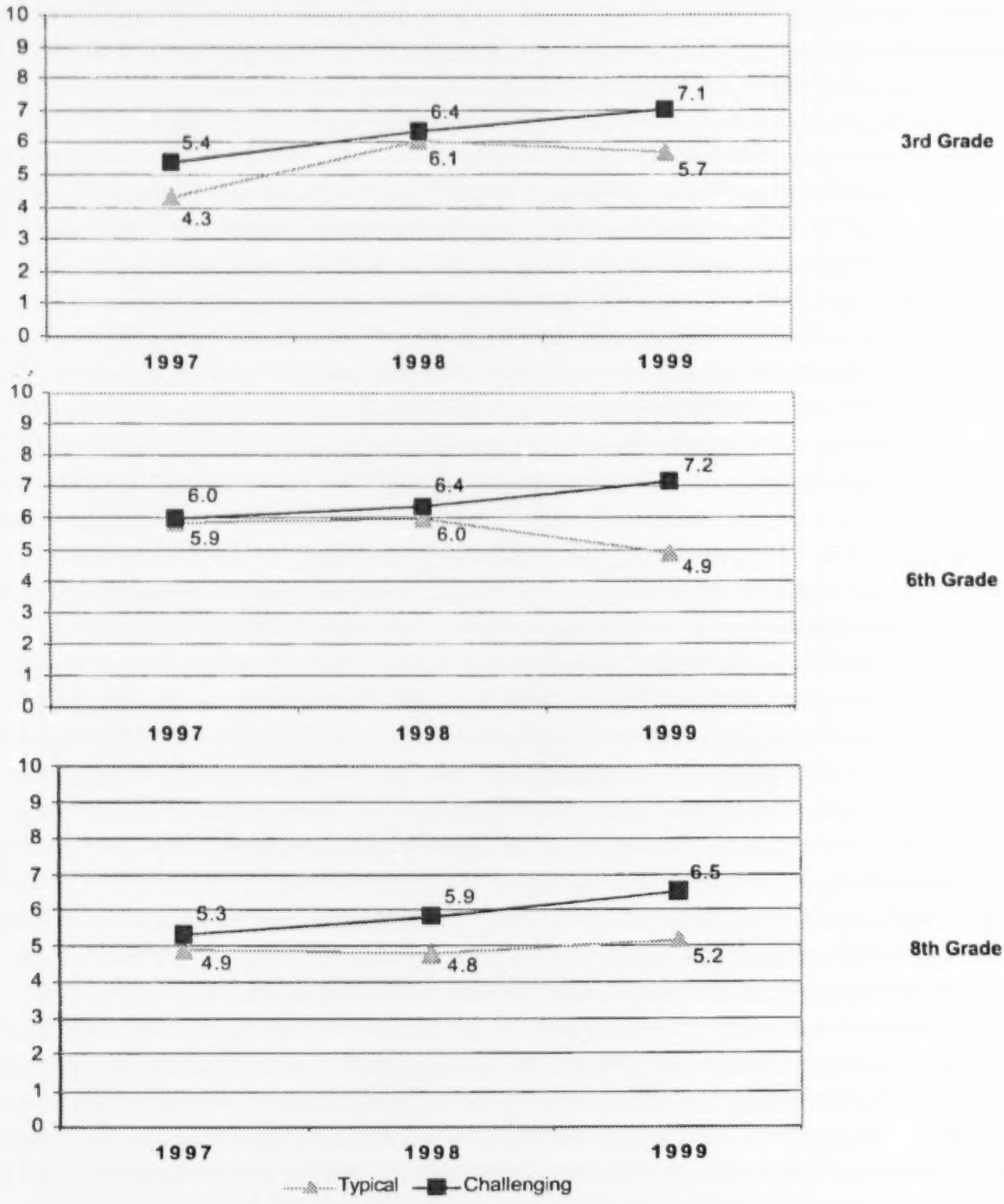


Figure 2

Trends in Mathematics Assignments
1997 to 1999



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in our sample of Chicago Annenberg schools. Although the results presented above indicate some positive trends, we think it is premature to draw conclusions from these data about effects of either the Chicago Annenberg Challenge or CPS policies on the quality of teachers' assignments. Future project analyses that take into account system-wide test score trends, survey reports, new evidence on teachers' assignments and student work, as well as in-depth studies of selected schools will provide much stronger evidence on the extent of school improvement and the factors that affected it.

Table 2

Distribution of Classroom Assignments by Level of Intellectual Challenge

1999 Writing

	3rd Grade	6th Grade	8th Grade
None	6%	18%	6%
Minimal	31%	34%	39%
Moderate	53%	40%	56%
Extensive	11%	8%	0%

1999 Math

	3rd Grade	6th Grade	8th Grade
None	27%	65%	40%
Minimal	27%	18%	51%
Moderate	42%	10%	9%
Extensive	4%	7%	0%

Note. Numbers may total more than 100 due to rounding.

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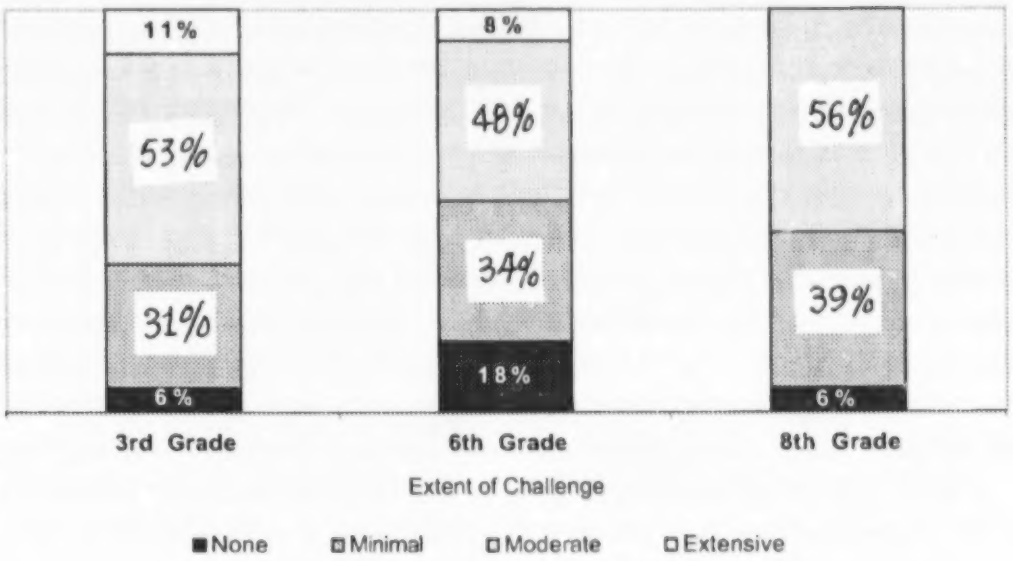
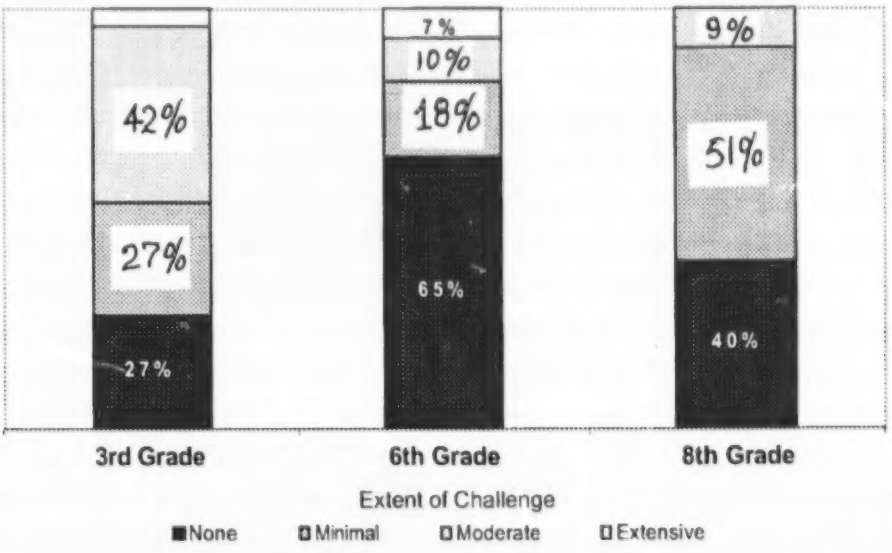
Figure 3

1999 Writing Assignments



1999 Mathematics Assignments

Figure 4



Note: Numbers may total more than 100 due to rounding.

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Endnotes

[1] For previous Consortium work on this topic see Bryk, Anthony S., Yeow Meng Thum, John Q. Easton, and Stuart Luppescu (1998), *Academic Productivity of Chicago Public Elementary Schools*; Easton, John Q., Brian Jacob, Stuart Luppescu, and Melissa Roderick (1998), *Adjusting Citywide ITBS Scores for Student Retention in Grades Three, Six, and Eight*; Easton, John Q., Todd Rosenkranz, Anthony S. Bryk, Brian A. Jacob, Stuart Luppescu, and Melissa Roderick (2000), *Annual CPS Test Trend Review, 1999*. In terms of recent test score trends for Annenberg schools see Smylie, Mark A., Stacy A. Wenzel, Penny Bender Sebring, Elaine Allensworth, Tania Gutierrez, Sara Hallman, Shazia Rafiullah Miller, with Stuart Luppescu (in progress), *Improvement in Chicago Annenberg Schools, 1996-1999: Interim Technical Report of the Chicago Annenberg Research Project*.

[2] The main public report of this research was Newmann and Wehlage (1995) which was distributed by the Wisconsin Center for Education Research, the American Federation of Teachers, the Association for Supervision and Curriculum Development, the National Association of Elementary School Principals, and the National Association of Secondary School Principals. A more detailed account is available in Newmann and Associates (1996). This research has been referenced in numerous professional publications and has been the subject of professional development for numerous schools and districts in the United States and abroad. The standards for intellectual quality have been integrated into Michigan's state curriculum standards and assessments and are the focus of research and school development projects in Australia. To be sure, this is not the only conceptual framework with associated scoring rubrics that could be applied to assess the intellectual challenge of classroom assignments. However, the framework is considered useful in many places for helping teachers move beyond traditional teaching of basic skills to more ambitious intellectual work.

[3] Newmann, Lopez, and Bryk (1998).

[4] See Newmann, Bryk, and Nagaoka (in press) for earlier results on this topic.

[5] Since the study began in mid-winter of the 1996-1997 school year, the project collected only two challenging and two typical assignments for a total of four assignments that year.

[6] Detailed descriptions of the standards and the rubrics used to score assignments are available from the Consortium on Chicago School Research. The standards for construction of knowledge and connection to students' lives were scored on a 3-point scale and elaborated communication on a 4-point scale.

[7] Working in grade level teams for each subject (writing and mathematics) and scoring one standard at a time, each assignment was initially scored on that standard by one of the teachers in the team. Then each year at least 60% of the assignments were scored independently (i.e., without knowledge of the initial score) on that standard by a different teacher in the team. The double-scored assignments were selected randomly from the pool of assignments. Each teacher in the team was paired with every other teacher to double score at least one of the standards.

[8] The many-facet Rasch measurement model used here is: $\log(P_{nijk}/P_{nij(k-1)}) = B_n - D_i - C_j - F_k$ where P_{nijk} is the probability of assignment n being given a rating of k on standard i by judge j, $P_{nij(k-1)}$ is the probability of assignment n being given a rating of k-1 on standard i by judge j, B_n is the intellectual challenge of assignment n, D_i is the difficulty of standard i, C_j is the severity of judge j, and F_k is the difficulty of receiving a score in category k rather than a score in the next lower category, k-1. See Linacre (1993) for further explanation of the model. Thus the final measure of the intellectual challenge in any assignment aggregates the score across all three standards, adjusted for the difficulty of each standard and the relative severity of the scorers. As in other item response theory applications, the final measure of assignment challenge exists in a logit metric. For reporting purposes we converted them to a simple 0 to 10 point scale.

[9] The cross-year rescoring design allowed us to adjust for all the 1997 and 1998 measures based on the average difference between the original scores and the 1999 re-scores. This adjustment was then added to the scores for all of the 1997 and 1998 assignments to put them on the same scale as the 1999 assignments. Specifically, we calculated a Tukey's bi-weighted mean for the difference between the original scores and rescores for each year, subject, and grade. This bi-weighted mean was chosen as the adjustment statistic because it is a robust statistic that down weights the influence of extreme outliers in the data. This seemed most appropriate, given that our difference statistic involved a number of extreme values (i.e., the distribution had "fat tails"). For a further discussion of this statistic see Mosteller and Tukey (1977).

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APPENDIX A

Additional Statistical Details on Classroom Assignments Data

Table A1. 1997 Demographics of CPS Schools and Chicago Annenberg Challenge Schools

	CPS	CAC Schools	Sample Schools
% At or Above Natl. Avg.- Reading	29.9%	28.3%	24.5%
% At or Above Natl. Avg.- Math	37.1%	34.9%	31.0%
% African-American	58.3%	59.8%	53.0%
% Latino	28.3%	29.4%	38.9%
% Low Income	84.7%	87.6%	89.4%

Table A2. Number of Assignments by Type, Subject, Grade, and Year

	Writing			Math		
	Typical	Challenging	**Total**	Typical	Challenging	**Total**
Third Grade						
1997	35	33	**68**	32	32	**64**
1998	135	61	**196**	142	64	**206**
1999	103	51	**154**	107	52	**159**
Sixth Grade						
1997	34	39	**73**	27	26	**53**
1998	100	46	**146**	107	51	**158**
1999	80	39	**119**	73	33	**106**
Eighth Grade						
1997	21	27	**48**	22	21	**43**
1998	86	41	**127**	84	36	**120**
1999	60	30	**90**	59	28	**87**

Table A3. Number of Teachers per Grade

	Grade 3	Grade 6	Grade 8
1997	23	29	22
1998	39	39	38
1999	32	28	27

APPENDIX B

Additional Details on Statistical Model

Different teachers and schools participated in this study over the course of three years. As a result, we have data from some teachers for three years (19 language arts teachers and 21 math teachers), some teachers for two years (35 language arts teachers and 33 math teachers), and many for only one year (102 language arts teachers and 91 math teachers). In addition, although we had a fixed data collection design, teachers actually provided us with a varying number of assignments, and the composition of these assignments in terms of challenging versus typical tasks also varied. Moreover, we found considerable variability among assignment scores from the same classroom. Given the high degree of internal variability in assignment scores and the limited amount of data from some years in some classrooms for our key predictor variable, we needed to develop a special measurement model in order to extract the maximum information present in these data.

We estimated the mean trends in the intellectual demands of assignments in writing and math in separate analyses using hierarchical linear models (HLM). The actual analytic model used was as follows. Level 1 was a measurement model with an intercept and two effects coded dummy variables for the years 1997 and 1999, with 1998 as the excluded category. The outcome variable consisted of the assignment measures generated from many-facet Rasch measurement (MFRM). All of the elements in the level-1 model were weighted by the inverse of the standard error of the assignment measures. (These are calculated as a by-product of the MFRM analysis.) The major function of this level-1 measurement model is to take into account the unreliability of the assignment scores. Formally, the three coefficients produced here, π_{1jk}, π_{2jk}, and π_{3jk}, can be thought of as latent "true score" for assignment j in classroom k. Each of these becomes an outcome variable in the level 2 model where we have multiple assignments per classroom.

Level 1

$$Y_{ijk} = \pi_{1jk} + \pi_{2jk}\,(1997) + \pi_{3jk}\,(1999) + \varepsilon_{ijk}$$

where Y_{ijk} = MFRM assignment quality score for mathematics or writing, and ε_{ijk} is now assumed $N(0,1)$ given the re-weighting by the standard errors of measurement.

Level 2

$$\pi_{1jk} = \beta_{10k} + \beta_{11k}\,(\text{Challenging}) + r_{10k}$$
$$\pi_{2jk} = \beta_{20k} + \beta_{21k}\,(\text{Challenging}) + r_{20k}$$
$$\pi_{3jk} = \beta_{30k} + \beta_{31k}\,(\text{Challenging}) + r_{30k}$$

Level 3

$$\beta_{10k} = \gamma_{100} + \gamma_{101}\,(\text{Grade 6}) + \gamma_{102}\,(\text{Grade 8}) + u_{1k}$$
$$\beta_{11k} = \gamma_{110}$$
$$\beta_{20k} = \gamma_{200} + \gamma_{201}\,(\text{Grade 6}) + \gamma_{202}\,(\text{Grade 8})$$
$$\beta_{21k} = \gamma_{210}$$
$$\beta_{30k} = \gamma_{300} + \gamma_{301}\,(\text{Grade 6}) + \gamma_{302}\,(\text{Grade 8})$$
$$\beta_{31k} = \gamma_{310}$$

A dummy variable was entered at level-2 to distinguish challenging from typical tasks with its effect fixed and grand-mean centered. As a result, the intercept term β_{10k} is the overall mean score, adjusted for differences among teachers in the number and types of assignments they submitted. β_{20k} and β_{30k} are the adjusted year effects for 1997 and 1999. Finally, at level 3 (i.e., the classroom level), indicator variables for grade 6 and grade 8 were included in order to estimate the grade-specific effects.

This report reflects the interpretation of its authors. Although the Consortium assisted in the development of this research, no formal endorsement by its Steering Committee members, their organizations, or the Consortium should be assumed.

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The Consortium on Chicago School Research is an independent federation of Chicago area organizations that conducts research on ways to improve Chicago's public schools and assess the progress of school improvement and reform. Formed in 1990, it is a multipartisan organization that includes faculty from area universities, leadership from the Chicago Public Schools, the Chicago Teachers Union, education advocacy groups, the Illinois State Board of Education, and the North Central Regional Educational Laboratory, as well as other key civic and professional leaders.

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